The Canadian Council of Ministers of the Environment (CCME) is currently working on Canada-Wide Standards for the control or virtual elimination of Particulate Matter, Dioxins and Furans, and Mercury from waste incinerators and other large volume producers of the materials.

Burning activities at waste disposal grounds affects several groups of people associated with the site's activities. These include users of the waste disposal ground, maintenance people, local area residents, businesses, land owners and possibly children who may be attracted to the site especially if it is close to a community. Many older waste disposal grounds were formerly located a short distance from the community they served. Today's urban spread has, in some cases, caused encroachment on existing waste disposal grounds with expected concerns and complaints.

Over the past several decades, major changes in waste composition have taken place with the introduction of synthetic products and packaging derived from hydrocarbons and chlorine including plastics, solvent, bleach or pesticides. Recent regulations ban hazardous substances and waste dangerous goods but many of these toxic materials are found at municipal waste disposal grounds as either components of packaging, household cleaning products or products. These materials may represent a much greater danger to public health and the environment than common materials found in household waste.

Burned under conditions found in burning barrels or waste disposal grounds such as low temperature ranges (250°C to 700°C), oxygen-starved conditions and the presence of hydrochloric acid or chlorine, mixed garbage will produce several different air toxics. These include total dioxins and furans, total volatile organic compounds measured as methane, air toxics, metals including antimony, arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, phosphorus and titanium, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO) and oxides of sulfur and nitrogen.

Particulate matter is the general term for particles of soot and dust in the atmosphere. Particulates are composed of organic matter and compounds containing sulphur, nitrogen and metals. These particles may be inhaled and irritate the respiratory system and prolonged inhalation may increase the number and severity of chronic respiratory disease cases.

Sulphur oxides may be released if refuse being burned contains sulphur compounds. Studies of serious air pollution occasions found an increase in mortalities among people with existing heart and lung disease. Even when concentrations are below what may be considered serious, there may be a noticeable increase in acute and chronic respiratory disease cases. Healthy people may experience sore throats, shortness of breath and breathing difficulties. Sulphur oxides can cause vegetation damage, corrode many materials and contribute to acid rain.

Carbon monoxide is a common pollutant which may be released from the incomplete combustion of municipal waste. This compound binds chemically to the haemoglobin in the blood stream, the substance which carries oxygen to the heart, brain and other body tissues. Exposure to carbon monoxide causes dizziness, headaches, slowed reflexes and reduces the ability to perform physical exercise. Even at relatively low concentrations, carbon monoxide can affect mental function, visual acuity and alertness.

Volatile Organic Compounds (VOCs) refers to a large group of compounds monoxide and carbon dioxide which may be released during the incomplete burning in municipal landfills of almost any kind of organic material including fats, meat, coffee, rubber and other material. Many VOCs are known to have direct toxic effects on humans, ranging from cancer risks to nervous system disorders. VOCs also contribute to the formation of ground level ozone (smog). Elevated ozone levels have been shown to cause adverse health effects on the human respiratory system and are strongly suspected of playing a role in the long term development of chronic lung disease. Ozone effects on vegetation damage are well documented with millions of dollars estimated in crop damage in certain areas of Canada due to elevated ozone levels.

Chlorofluorocarbons (CFCs), which are VOCs, are the primary contributors to stratospheric ozone level depletion and are involved in the global warming effect.

Nitrogen Oxides (NO_x) may be released in the open burning of municipal refuse. Certain nitrogen compounds may cause adverse health effects to the human respiratory system. The primary concerns with NO_x emissions are their contribution to the formation of ground level ozone and acid rain. To a lesser extent, some NO_x compounds contribute to stratospheric ozone layer depletion and global warming.

Saskatchewan Environment and Resource Management

Environmental Protection Branch

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Pollutant	Health Effects	Environmental Effects
Particulate Matter (PM)	Irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary disease	Increased toxic loading on the environment; leads to contaminated water/land and affects animal health
Sulphur Oxides	Increase in heart/lung disease, acute/chronic respiratory disease. Healthy people experience shortness of breath, sore throats, breathing difficulties	Causes vegetative damage; corrodes many materials; contributes to acid rain (forests, aquatic and urban environments i.e. structures)
Carbon Monoxide	Causes dizziness, headaches and slowed reflexes. Affects mental function, visual acuity and alertness	Oxidized to carbon dioxide (which is a greenhouse gas) in the atmosphere
Volatile Organic Compounds (VOCs)	Directly toxic including problems ranging from cancer risks to nervous disorders. Causes respiratory irritation/illness, chronic lung disease	Contributes to low level ozone (smog), causes vegetative damage. Leads to contaminated water/land, affects animal health
Nitrogen Oxides	Causes respiratory illness, fluid collection in the lungs and fibrotic changes	Contributes to acid rain and ozone formation
Polynuclear Hydrocarbons	May cause cancer	Increased toxic loading on environment; leads to contaminated water/land, affects animal health
Aldehydes	Causes eye and respiratory tract irritation, headaches. Is an animal carcinogen	Increased toxic loading on environment; leads to contaminated water/land, affects animal health
Dioxins and Furans	May cause cancer; causes growth defects; affects DNA; affects immune and reproductive systems	Increased toxic loading on environment; leads to contaminated water/land, affects animal health
Heavy Metals (such as Mercury)	Highly toxic; heavy metals collect in the human system until a lethal dosage is reached. Causes respiratory/intestinal problems	Increased toxic loading on environment; leads to contaminated water/land, affects animal health
Hydrochloric Acid	Irritation of respiratory tract, causes respiratory illness; dulls the body's senses	Increased toxic loading on environment; leads to contaminated water and land; affects animal health
Hydrogen Sulfide (H_2S)	Toxic, causes respiratory disease. Healthy people experience shortness of breath, sore throats, breathing difficulties, irritated eyes	Contributes to acid rain; may damage vegetation; causes offensive odours